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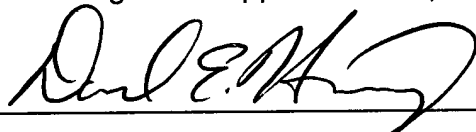
Applicants: Marc Cartier and Mark Gailus
Serial No.: 09/685,306 ✓
For: METHODS AND APPARATUS FOR FORMING A CONNECTION
BETWEEN A CIRCUIT BOARD AND A CONNECTOR
Filing Date: October 10, 2000
Examiner: Alcala, Jose H.
Art Unit: 2827

Certificate of Mailing Under 37 C.F.R. §1.8

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By: David E. Huang
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Signature: 

BOX AMENDMENT

Assistant Commissioner for Patents
Washington, DC 20231

AMENDMENT

Sir:

In response to the Office Action mailed March 13, 2002, please amend the above-identified Application as follows:

06/25/2002 SSESHE1 00000045 09685306

36.00 OP
64.00 OP

01 FC:103
02 FC:102

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IN THE DRAWINGS

Please amend the Drawings as indicated on the separately enclosed sheet with changes labeled in red ink.

IN THE ABSTRACT

Please replace the original Abstract page with the new Abstract page which is on the attached sheet.

IN THE SPECIFICATION

Please replace the paragraph on page 9, lines 4 through 11 with the following paragraph:

Fig. 1 shows a connection system 20 which is suitable for use by the invention. The connection system 20 includes a circuit board 22 having, among other things, a section of the circuit board 24 upon which reside signal launches 26-1, ..., 26-N (collectively signal launches 26). Each signal launch 26 includes multiple vias 28 (plated-through holes), and a pin 30 that inserts into a particular one of the vias 28 when moved in a direction 31 that is perpendicular to the plane of the circuit board 22. In one arrangement, the pin 30 solders to that via 28. In another arrangement, the pin 30 installs within that via 28 in a press-fit manner and is more easily removable.

IN THE CLAIMS

Please enter the following amendments to the claims which are further shown in the attached Appendix with markings to show the changes made:

Please cancel claims 19-21 without prejudice as to the subject matter contained therein.

-
1. (Amended) A circuit board, comprising:

a circuit board portion having a signal layer, a ground layer, and dielectric material that physically separates the signal layer and the ground layer; and

a signal launch having:

a signal via that physically contacts a signal conductor of the signal layer and the dielectric material of the section of circuit board material, and

a first set of ground vias and a second set of ground vias that physically contact a ground conductor of the ground layer and the dielectric material of the section of circuit board material, wherein each of the first set of ground vias is disposed a first radial distance from the signal via, wherein each of the second set of ground vias is disposed a second radial distance from the signal via, and wherein the first and second radial distances are different.

2. (Amended) The circuit board of claim 1 wherein the signal launch further includes:

a ground pad, disposed on a surface of the circuit board portion, the ground pad physically contacting each of the first and second sets of ground vias of the signal launch and the dielectric material of the circuit board portion.

3. (Amended) The circuit board of claim 1 wherein the signal launch further includes:

a first ground pad, disposed on a first surface of the circuit board portion, the first ground pad physically contacting each of the first and

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42/1
contd

second sets of ground vias of the signal launch and the dielectric material of the circuit board portion; and

a second ground pad, disposed on a second surface of the circuit board portion that is coplanar with the first surface of the circuit board portion, the second ground pad physically contacting each of the first and second sets of ground vias of the signal launch and the dielectric material of the circuit board portion.

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7. (Amended) The circuit board of claim 1 wherein the signal launch further includes:

a signal pin that electrically connects with the signal conductor of the circuit board portion through the signal via, the signal pin extending perpendicularly from a plane of the circuit board portion.

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10. (Amended) The circuit board of claim 1 wherein the dielectric material of the circuit board portion separates the first set of ground vias from the signal via by less than 0.082 of an inch.

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12. (Amended) The circuit board of claim 1 wherein the circuit board portion includes (i) a connecting surface that faces a connector when the connector connects to the signal launch and (ii) a distal surface that faces away from the connector when the connector connects to the signal launch, and wherein the signal conductor of the circuit board portion connects with the signal via of the signal launch at a point along the signal via that is closer to the distal surface than the connecting surface.

13. (Amended) A connection system, comprising:
a circuit board that includes (i) a circuit board portion having a signal layer, a ground layer, and dielectric material that physically

separates the signal layer and the ground layer, and (ii) a signal launch having:

a signal via that physically contacts a signal conductor of the signal layer and the dielectric material of the circuit board portion, and

a first set of ground vias and a second set of ground vias that physically contact a ground conductor of the ground layer and the dielectric material of the circuit board portion, wherein each of the first set of ground vias is disposed a first radial distance from the signal via, wherein each of the second set of ground vias is disposed a second radial distance from the signal via, and wherein the first and second radial distances are different; and

a coaxial connector that mounts to the signal launch of the circuit board in order to provide electrical access to the signal and ground conductors of the circuit board portion.

14. (Amended) The connection system of claim 13 wherein the signal launch of the circuit board further includes:

a ground pad, disposed on a surface of the circuit board portion, the ground pad physically contacting each of the first and second sets of ground vias of the signal launch and the dielectric material of the circuit board portion.

18. (Amended) The connection system of claim 13 wherein the signal launch further includes:

a signal pin that electrically connects with the signal conductor of the signal layer through the signal via, the signal pin extending perpendicularly from a plane of the circuit board portion.

22. (Newly Added) The circuit board of claim 1 wherein the first set of ground vias includes multiple first ground vias which are substantially evenly distributed in a radial manner around the signal via, and wherein the second set of ground vias includes multiple second ground vias which are substantially evenly distributed in a radial manner around the signal via.
23. (Newly Added) The circuit board of claim 22 wherein the signal via, at least two of the first ground vias and at least two of the second ground vias are disposed co-linearly.
24. (Newly Added) The connection system of claim 13 wherein the first set of ground vias includes multiple first ground vias which are substantially evenly distributed in a radial manner around the signal via, and wherein the second set of ground vias includes multiple second ground vias which are substantially evenly distributed in a radial manner around the signal via.
25. (Newly Added) The circuit board of claim 24 wherein the signal via, at least two of the first ground vias and at least two of the second ground vias are disposed co-linearly.
26. (Newly Added) A circuit board, comprising:
- a section of circuit board material having a signal conductor, a ground conductor, and dielectric material that physically separates the signal conductor and the ground conductor; and
 - a signal launch having:
 - a signal via that physically contacts the signal conductor and the dielectric material of the section of circuit board material, and

a first set of ground vias and a second set of ground vias that physically contact the ground conductor and the dielectric material of the section of circuit board material, wherein each of the first set of ground vias is disposed a first radial distance from the signal via, wherein each of the second set of ground vias is disposed a second radial distance from the signal via, and wherein the first and second radial distances are different.

27. (Newly Added) A connection system, comprising:

a circuit board that includes (i) a section of circuit board material having a signal conductor, a ground conductor, and dielectric material that physically separates the signal conductor and the ground conductor, and (ii) a signal launch having:

a signal via that physically contacts the signal conductor and the dielectric material of the section of circuit board material, and

a first set of ground vias and a second set of ground vias that physically contact the ground conductor and the dielectric material of the section of circuit board material, wherein each of the first set of ground vias is disposed a first radial distance from the signal via, wherein each of the second set of ground vias is disposed a second radial distance from the signal via, and wherein the first and second radial distances are different; and

a coaxial connector that mounts to the signal launch of the circuit board in order to provide electrical access to the signal and ground conductors of the circuit board.

REMARKS

In response to the Office Action mailed March 13, 2002, Applicants respectfully request reconsideration. To further the prosecution of this Application, Applicants submit the following remarks, have canceled claims and have added new claims. The claims as now presented are believed to be in allowable condition.

Claims 1-21 were pending in this application. Claims 1-18 were under consideration. Claims 19-21 were withdrawn from consideration. By this Amendment, claims 19-21 have been canceled without prejudice as to the subject matter contained therein. Additionally, claims 22-27 have been added. Accordingly, claims 1-18 and 22-27 are now pending in this application. Claims 1, 13, 26 and 27 are independent claims.

In the Drawings

The Drawings were objected to due to a few minor informalities. Applicants have submitted a proposed amendment to the Drawings to cure some of these informalities. In particular, Applicants have corrected a misplaced reference numeral (i.e., reference numeral 52 in Fig. 2) as pointed out by the Office Action on page 3, lines 5-9. Additionally, Applicants have replaced a dashed phantom line in Fig. 2 with a differently dashed phantom line as pointed out by the Office Action on page 2, paragraph 4. Applicants will attend to the submission of Formal Drawings which correct this informality within the Formal Drawings at a future time, and at least by the time of paying any issue fee in response to any Notice of Allowance for this Application. No new matter has been added.

Applicants wish to point out that it is somewhat unclear which dashed lines were objected to by the Office Action (see page 2, paragraph 4), and have made an effort to correct the objected to crosshatched line. However, there are other dashed lines which Applicants believe are correctly shown as hidden lines with proper crosshatching. If there are still improperly crosshatched lines, Applicants

respectfully request that the Examiner or Official Draftsperson point out with particularity which lines are in question.

Additionally, the Office Action (on page 2, paragraph 3) objected to the Drawings contending that, in Fig. 3, reference numerals 54 and 56 do not point to diameters of ground vias as defined within the Specification and indicates that this objection to the Drawings will not be held in abeyance. Applicants respectfully traverse this objection and wish to point out that reference numerals 54 and 56 do point to diameters of ground vias as defined within the Specification. In particular, page 10, lines 17-20 describe ground vias 48 as having inner diameters 54, and ground vias 50 as having inner diameters 56. These diameters 54, 56 are further shown correctly in Fig. 2. In Fig. 3, reference numeral 54 points to the ground via 48. Similarly, in Fig. 3, reference numeral 56 points to the ground via 50. Accordingly, reference numerals 54 and 56 do point to diameters of ground vias as defined within the Specification.

Applicants wish to point out that, in compliance with M.P.E.P. §608.02(r), Applicants have provided (i) a copy of Fig. 2 with the proposed changes labeled in red ink, and (ii) a separate Letter to the Official Draftsperson.

Since Applicants have attended to and/or addressed each of the informalities in the Drawings, Applicants have overcome the objection to the Drawings. Accordingly, the objection to the Drawings should be withdrawn.

Objections to the Specification

The Office Action objected to the original Abstract contending that the original Abstract is too extensive. Applicants have amended the original Abstract by submitting a replacement Abstract on a separate sheet.

The Office Action objected to the disclosure contending that the term "a section of circuit board material" is unclear and suggests changing it to "a section of the circuit board". Although Applicants disagree, Applicants have amended the disclosure along these lines in order to further the prosecution of the Application. No new matter has been added.

Objections to the Claims

Claims 1-3, 7, 12, 13-14 and 18 were objected to by the Office Action. In particular, the Office Action objected to claims 1-3, 7, 13 and 14 in view of the term "a section of circuit board material". Additionally, the Office Action objected to claims 1, 7, 12, 13 and 18 in view of the term "conductor". Furthermore, the Office Action objected to claim 12 due to a minor informality. In order to further the prosecution of the Application, Applicants have amended the claims to cure these objections, and thus the objections to claims 1-3, 7, 12, 13-14 and 18 should be withdrawn.

However, Applicants also submit newly added independent claims 26 and 27 which are identical copies of originally submitted independent claims 1 and 13, respectively, and respectfully traverse the above-mentioned objections to claims 1 and 13. Applicants' arguments for this traversal now follow.

The Office Action (on page 3, paragraph 7) objected to claims 1 and 13, contending that:

It is not clear what is meant by "a section of circuit board material", a circuit board is composed of several elements made of different materials such as ceramic, silicon, polymers and metals, but there is not one specific material that is called a "circuit board material". It is suggested to change it to: "a section of the circuit board". Appropriate correction is required.

Applicants respectfully traverse this objection by submitting that no legal basis has been provided to properly object to these claims. In particular, there is no definiteness problem with the term "a section of circuit board material" and no definiteness problem raised by the Office Action. The Office Action may have inadvertently confused breadth with indefiniteness. As the Office Action indicates, there is not one specific material that is called "circuit board material" and such recitation is broad enough to cover a variety of materials such as ceramic, silicon, polymers and metals, among others. Accordingly, claims 26

and 27 are definite and broad, and should not be objected to in view of the term "a section of circuit board material".

Similarly, the Office Action further contends that:

The use of the word "conductor" as in "signal conductor" and "ground conductor" is not clear enough to disclose particulars of the invention, it is suggested to change it to "signal layer" or "ground layer". Appropriate correction is required.

Applicants again respectfully traverse this objection by submitting that no legal basis has been provided as to why such claims require disclosure of more particulars of the invention. There is no definiteness problem with the term "conductor" as used in claims 1 and 13 and no definiteness problem raised by the Office Action. Again, here, the Office Action may have inadvertently confused breadth with indefiniteness. As the Office Action indicates, the term conductor is broad enough to cover a signal conductor or a ground conductor, as well as a signal layer or a ground layer. However, there is no statute or rule in U.S. Patent Law practice requiring that Applicants unnecessarily place a more-narrowing limitation in the claims such as that proposed by the Office Action.

For the reasons stated above, newly added independent claims 26 and 27, which are identical to originally submitted independent claims 1 and 13, are clear and definite. Accordingly, there should be no objection to claims 26 and 27 in view of the terms "a section of circuit board material" and "conductor". If the Examiner wishes to object to claims 26 and 27, Applicants respectfully request that the Examiner point out with particularity a basis under U.S. Patent Law why such claims should be objected to.

Rejections Under 35 USC §112

Claims 1-2, 7, 12, 14 and 18 were rejected under 35 USC §112, second paragraph, as being indefinite for failing to point out and distinctly claim the

subject matter of the invention. Applicants respectfully traverse each of these rejections.

In connection with claims 1 and 13, the Office Action contends (on page 4, lines 12-15) that it is not clear how the signal launch can include the signal and ground vias, and not include the signal and ground conductors. In contrast to this contention, it is clear how the signal launch can include signal and ground vias, and not include signal and ground conductors of a circuit board portion (or a section of circuit board material). Applicants respectfully wish to point out that adding signal and ground vias to a circuit board structure is common to the circuit board manufacturing industry. In particular, a circuit board portion (or a section of circuit board material) can support a features attached thereto. For example, after a variety of individual etched circuit board structures are glued together and cut to form a single, aggregate circuit board structure, at least a portion of the aggregate circuit board structure (e.g., a circuit board portion or section of circuit board material) can be exposed to an immersion process (e.g., nickel immersion) to form plated features such as signal and ground vias which connect to signal and ground conductors of the aggregate circuit board structure. Accordingly, the rejection of claims 1 and 13 under 35 USC §112, second paragraph, should be withdrawn.

In connection with claims 2 and 14, the Office Action contends (on page 4, lines 16-21) that these claims are

incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP §2172.01. The omitted structural cooperative relationships are: How is the surface of the section of circuit board located with relation to the signal and ground conductors and the dielectric material.

Applicants respectfully wish to point out that these claims are complete and certainly comply with MPEP §2172.01 because they clearly and distinctly recite interrelations between elements. In particular, claims 2 and 14 recite a ground

pad disposed on a surface of a section of circuit board material (or a circuit board portion, as amended). By way of example only, such an interrelation is illustrated in Fig. 3 (e.g., a section of circuit board material 24, and ground pads 70-A, 70-B disposed on the surfaces of the section of circuit board material 24).

Accordingly, the rejection of claims 2 and 14 under 35 USC §112, second paragraph, should be withdrawn.

In connection with claim 3, the Office Action (on page 4, line 22 through page 5, line 2) states:

Claim 3 is not clear regarding, how can the first and second surfaces be coplanar, and physically contact each other of the first and second set of ground vias. It is not clear, because the first and second set of ground vias are both located at radial distance how this can be done, because the first e (*sic*)

Applicants understand this to mean that the Office Action does not know how the circuit board portion can have two coplanar surfaces and how first and second ground pads disposed thereon can contact ground vias. Applicants respectfully direct the Examiner to Fig. 3 which shows, by way of example only, a section of circuit board material 24, and two ground pads 70-A, 70-B disposed on coplanar surfaces of the section 24, and contacting ground vias 48, 50 which contact the two ground pads 70-A, 70-B. Accordingly, the rejection of claim 3 under 35 USC §112, second paragraph, should be withdrawn.

In connection with claims 7, 12 and 18, the Office Action contends that these claims are

incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP §2172.01. The omitted structural cooperative relationships are: Where does the signal pin begin, is it completely inside of the section of printed circuit board, or does it extend to the outside of the section? In addition, it is not clear what it means to "extending perpendicularly from a plane", is it that it starts on the plane on the section of circuit board material, or if it starts in the outside of the board.

Applicants respectfully wish to point out that claims 7, 12 and 18 are complete and comply with MPEP §2172.01 because they clearly and distinctly recite interrelations between elements. In particular, claims 7, 12 and 18 clearly recite “a signal pin that electrically connects with the signal conductor of the circuit board portion through the signal via, the signal pin extending perpendicularly from a plane of the circuit board portion”. Moreover, and by way of example only, Fig. 3 clearly shows a plane 80 (also see page 12, lines 28-29 of the Specification) of the section of circuit board material 24 and a pin 30 extending in a direction 78 which is substantially perpendicular to the plane 80. Applicants further submit that the Office Action's assertion that Applicants must include limitations in claims 7, 12 and 18 as to where the signal pin begins and whether the pin extends outside the section is unreasonable. There is no legal basis requiring Applicants to include such limitations. For the reasons stated above, the rejection of claims 7 and 18 under 35 USC §112, second paragraph, should be withdrawn.

In further connection with claim 12, the Office Action contends that claim 12 is:

incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP §2172.01. The omitted structural cooperative relationships are: ... In addition it is not clear how a surface can be part of the section of circuit board, but be distal to a surface on the same section of circuit board. Additionally, it is further unclear how are the connecting surface and the distal surface located, with regards to the other elements of the section of circuit board such as the signal and ground conductors, and the dielectric layer.

Claim 12 recites “wherein the circuit board portion includes (i) a connecting surface that faces a connector when the connector connects to the signal launch and (ii) a distal surface that faces away from the connector when the connector connects to the signal launch, and wherein the signal conductor of the circuit board portion connects with the signal via of the signal launch at a point along

the signal via that is closer to the distal surface than the connecting surface.” By way of example only, Fig. 3 clearly shows a section of circuit board material 24 having a connecting surface (e.g., a top surface of the section 24), a distal surface (e.g., a bottom surface of the section 24), a signal via 46 and a signal conductor 60 which connects with the signal via 46 at a point along the signal via 46 that is closer to the distal surface (e.g., the bottom surface of the section 24) than the connecting surface (e.g., the top surface of the section 24). Accordingly, claim 12 is clear. Furthermore, the Office Action’s request that claim 12 further include limitations placing the connecting and distal surfaces relative to signal and ground conductors and the dielectric layer is unreasonable. There is no legal basis obligating Applicants to include such limitations in claim 12. For the reasons stated above, the rejection of claim 12 under 35 USC §112, second paragraph, should be withdrawn.

In connection with claim 13, the Office Action (on page 6, lines 3 through 8) further states that it is:

unclear in how the coaxial connector is mounted to the signal launch. In addition it is not clear how the coaxial connector is the one that “provide(s) electrical access to the signal and ground conductors”, if that is the purpose of the signal and ground vias. If what is meant is that the coaxial connector is electrically connecting the signal conductor to the ground conductor, it is suggested in line 18 to change from “provide electrical access to” to: “electrically connect”.

Applicants respectfully wish to point out that there is no legal requirement set forth as to why Applicants must add a limitation to claim 13 indicating how the coaxial connector mounts to the signal launch. The Specification clearly and thoroughly describes how such mounting can occur (e.g., see page 9, lines 19 through 26, page 10 line 28 through page 11, line 14, and Fig. 1). Furthermore, there is nothing legally wrong about reciting “a coaxial connector that mounts to the signal launch of the circuit board in order to provide electrical access to the signal and ground conductors of the circuit board portion”. Those of skill in the

art will understand that electrical access to the signal and ground conductors of the circuit board portion is obtainable through the coaxial connector when the coaxial connector mounts to the signal launch. For the reasons stated above, the rejection of claim 13 under 35 USC §112, second paragraph, should be withdrawn.

In connection with claim 18, the Office Action (on page 6, lines 9 through 10) contends that it is unclear regarding how is the signal pin located with relation to the coaxial connector. Again, Applicants respectfully traverse and submit that there is no legal requirement mandating that Applicants place a limitation in claim 18 stating how the signal pin is located with relation to the coaxial connector. Claim 18 is clear and meets the statutory requirements under 35 USC §112, second paragraph, without having to unduly add such a limitation. Accordingly, the rejection of claim 18 under 35 USC §112, second paragraph, should be withdrawn.

Rejection Under 35 USC §103

Claims 1-18 were under 35 USC §103(a) as being unpatentable over U.S. Patent No. 5,828,555 (Itoh) in view of U.S. Patent No. 6,194,669 (Bjorndahl et al.). Although Applicants have made clarifying amendments to the claims as a courtesy to the Examiner to remove raised informality objections to the claims, Applicants have not made substantive amendments to the claims and respectfully traverse the §103 rejection.

Itoh teaches a high-frequency circuit device 100 which utilizes a multiplayer printed-circuit board 30 (column 5, lines 64-66, and Figs. 9, 10 and 2). Printed circuit boards 102, 103 electrically connect to a back board 101 of the high-frequency circuit device 100 (column 5, line 66 through column 6, line 13 and Figs. 9 and 10). Parts of the back board 101 are the same as those of the multiplayer printed circuit board 30 (column 6, lines 13-21). Two coaxial connectors 108 connect to sets of through holes 44, 45, 46, 47 but leaving sets of through holes 42, 43 exposed (column 6, lines 23-32, Fig. 11 and Figs. 2-3).

Itoh further teaches slit-shaped through holes 40, 41 above and below the through holes 44, 45, 46, 47 (column 3, lines 55-59 and Figs. 1-3).

Bjorndahl teaches a coaxial-like interconnection ball grid array 10 which interconnects the coaxial port of a millimeter wave module 12 with a coaxial port on an electronic component, such as a polymeric circuit board 14 (column 3, lines 35-39 and Figs. 1-3). The coaxial-like interconnection is formed from solder balls in a three-by-three square array 10 (column 3, lines 46-48 and Figs. 1-2). A centrally disposed solder ball 16 interconnects with a centrally disposed conductor 18 of a coaxial line 26 (column 3, lines 48-51 and Fig. 1). Solder balls 20, 22 surround the solder ball 16, some balls 20 of which interconnect with a coaxial ground shield 24 of the coaxial line 26 (column 3, lines 51-55).

In contrast to the cited references, claim 1 is directed to a circuit board that includes a circuit board portion having a signal layer, a ground layer, and dielectric material that physically separates the signal layer and the ground layer. The circuit board further includes a signal launch having (i) a signal via that physically contacts a signal conductor of the signal layer and the dielectric material of the section of circuit board material, and (ii) a first set of ground vias and a second set of ground vias that physically contact a ground conductor of the ground layer and the dielectric material of the section of circuit board material. Each of the first set of ground vias is disposed a first radial distance from the signal via. Each of the second set of ground vias is disposed a second radial distance from the signal via. The first and second radial distances are different.

The cited references do not teach or suggest, either alone or in combination, a circuit board that includes a signal launch having a first set of ground vias disposed a first radial distance from a signal via, and a second set of ground vias disposed a second radial distance from the signal via, where the first and second radial distances are different, as recited in claim 1. Rather, Itoh shows a through hole 44 (or 46) that attach to a signal line 33, and through holes 46 (or 47) which are all the same radial distance from the through hole 44 (see Figs. 2-4 of Itoh). If one were to argue that through holes 44 (or 46) and through

holes 46 (or 47) are a first set of vias of a signal launch disposed a first radial distance from a signal via due to the coaxial connector 108 (see Fig. 11 of Itoh), the signal launch of Itoh does not include a second set of vias disposed a second radial distance from the signal via, where the first and second radial distances are different, as recited in claim 1. Furthermore, it is unclear how one could or why one would want to add a second set of vias disposed a second radial distance from the signal via due to the presence of slit-shaped through holes 40, 41. Bjorndahl which was cited as teaching a three-by-three array of solder balls 16, 20, 22 does not teach or suggest any vias whatsoever.

The Office Action (on page 7, lines 8-10) states that Itoh fails to teach that each of the second set of ground vias is disposed a second radial distance from the signal via and wherein the first and second radial distances are different. Applicants agree.

However, the Office Action further (on page 7, lines 11-15) contends that "Bjorndahl teaches an array for use in a circuit board, consisting of a layer having a first set of vias (Reference number 20) disposed a first radial distance from a center via used to transmit a signal (Reference number 16), and a second set of vias (Reference number 20) disposed a second radial distance from the signal via, and wherein the first and second radial distances are different." Applicants respectfully traverse this contention. Applicants cannot find any mention of vias or through holes in Bjorndahl. Furthermore, in Bjorndahl, reference numerals 16, 20 (and 22) refer to solder balls of a three-by-three array of solder balls on a BGA component, not vias of a circuit board. Moreover, it is unclear how one could modify either the Itoh device to include a three-by-three array of solder balls, or the Bjorndahl to include the through holes of Itoh in order to obtain the invention as recited in claim 1. Additionally, it is unclear why one would want to modify the Itoh device since Itoh explains that it is already well-suited for high-frequency operation, or the Bjorndahl device because Bjorndahl also explains that it is also already well-suited for high-frequency operation.

For the reasons stated above, claim 1 patentably distinguishes over the cited prior art. Accordingly, the rejection of claim 1 under 35 USC §103 should be withdrawn, and claim 1 is now in allowable condition.

Because claims 2-12 depend from and further limit claim 1, claims 2-12 are in allowable condition as well.

Claim 13 is directed to a connection system having, among other things, a circuit board which is similar to that recited in claim 1. Accordingly, the arguments set forth above in connection with claim 1 apply to claim 13 as well. Thus, claim 13 patentably distinguishes over the cited prior art for at least the same reasons as claim 1. As a result, the rejection of claim 13 under 35 USC §103 should be withdrawn, and claim 13 is now in allowable condition.

Because claims 14-18 depend from and further limit claim 13, claims 14-18 are in allowable condition as well.

Newly Added Claims

Claims 22-27 have been newly added and are believed to be in allowable condition. Claims 22-23 depend from independent claim 1. Claims 24-25 depend from independent claim 13. Support for these claims can be found in the Specification, for example, on page 10, lines 11-27 and Figs. 1 and 3. No new matter has been added.

Claim 26 is identical to claim 1 as originally filed. Claim 27 is identical to claim 13 as originally filed. Applicant has addressed the reasons why claims 26 and 27 should be allowed by traversing the Office Action's contention regarding the terms "a section of circuit board material" and "conductor" in the above-provided section regarding the objection to the claims, and in arguments submitted in connection with the rejections under 35 USC §112, second paragraph and under 35 USC §103. Favorable consideration is respectfully requested.

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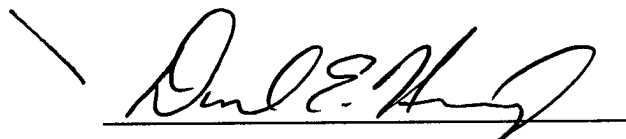
Conclusion

In view of the foregoing remarks, this Application should be in condition for allowance. A Notice to this affect is respectfully requested. If the Examiner believes, after this Response, that the Application is not in condition for allowance, the Examiner is respectfully requested to call the Applicants' Representative at the number below.

Applicants hereby petition for any extension of time which is required to maintain the pendency of this case. If there is a fee occasioned by this response, including an extension fee, that is not covered by an enclosed check, please charge any deficiency to Deposit Account No. 50-0901.

If the enclosed papers or fees are considered incomplete, the Patent Office is respectfully requested to contact the undersigned collect at (508) 366-9600, in Westborough, Massachusetts.

Respectfully submitted,



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Attorney Docket No.: TER00-03

Dated: June 13, 2002